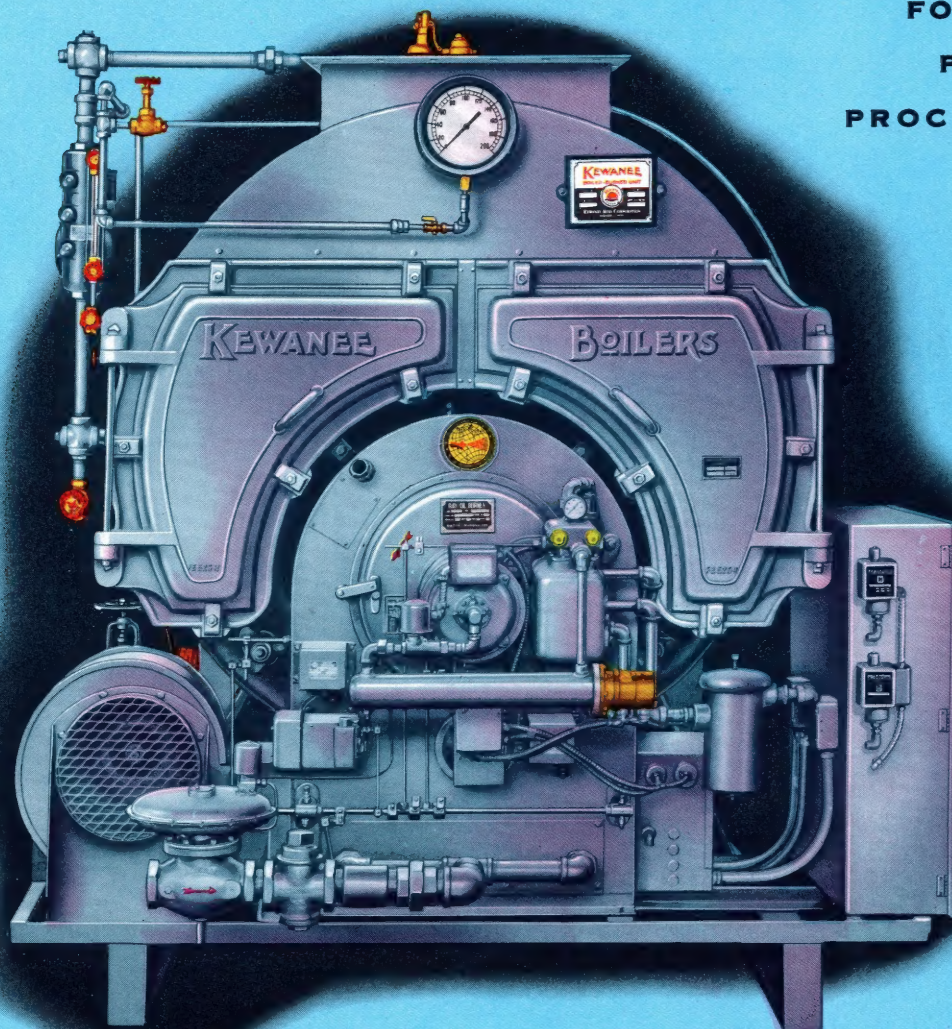


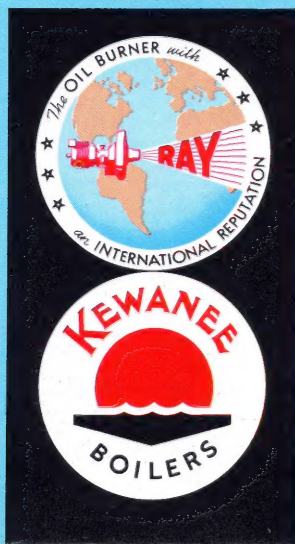
# KEWANEE - RAY

## BOILER-BURNER UNIT

FOR HEATING  
POWER AND  
PROCESS STEAM



Oil, Gas or Gas-oil Combination



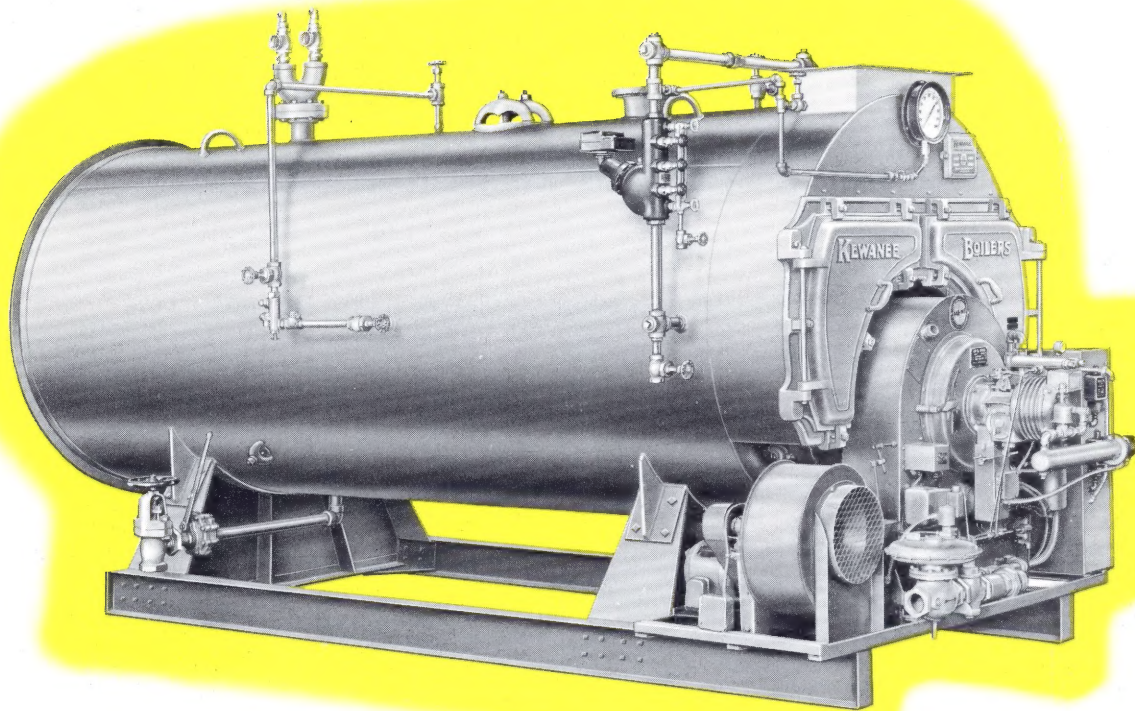
**RAY OIL BURNER COMPANY**

1301 SAN JOSE AVE. — SAN FRANCISCO 12, CALIFORNIA

**KEWANEE-ROSS CORPORATION**

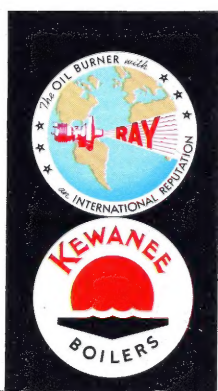
101 FRANKLIN ST. — KEWANEE, ILLINOIS





## THE KEWANEE-RAY BOILER-BURNER UNIT

pre-engineered and  
completely integrated  
for balanced performance



BACKED BY A TOTAL OF 166 YEARS



The Kewanee-Ray is not just another Boiler-Burner Unit! On the contrary—it is a product designed, engineered and built by two great companies . . . each a pioneer in its field. Each of the component parts has been completely integrated with all the others for greater efficiency and complete dependability of the entire unit.

Boilers were rather crude affairs some 85 years ago when the first Kewanee was built. In those days specifications were made more by guesswork than actual engineering knowledge and experience. And to be both safe and sure many of them were purposely made larger than needed and occupied more space and more head room than is practical in modern buildings and plants.

Through all the years Kewanee has set the pace in advancing new ideas of design and new and better methods of fabrication. Today, each of the many Kewanee types leads in its specific field.

Just a few years later . . . in 1872 . . . the Ray Oil Burner Company began its notable career as engineers, designers and makers of combustion equipment. Today *every third rotary oil burner in service is a Ray* which is convincing evidence that this pioneer company remains a leader in the industry.

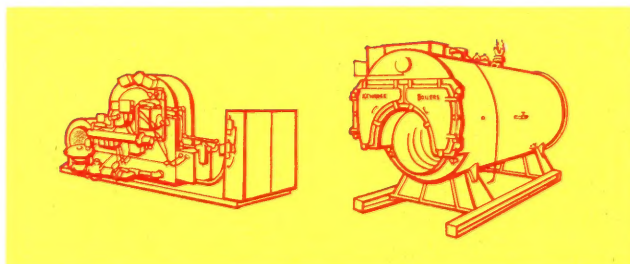
But the Ray and Kewanee engineering staffs did not stop with the designing and building of a burner and boiler. All controls needed for the boiler or burner . . . the valves, pumps, gauges, fans and other accessories, not manufactured by Ray or Kewanee, were carefully selected from the best—then tested in the complete units to be certain that every part would work in harmony with all the others.

That the Kewanee-Ray Unit generates steam with new “highs” in efficiency is not surprising . . . for it is specifically designed and engineered to do a better job, whether used for high or low pressure steam or hot water heating.

## Matched boiler and burner connections

The boiler arrives on the job mounted on steel skids extended at the front for mounting the burner. No special base construction is required. All refractories are integrally mounted at the factory, reducing to a minimum the labor required “on the job” to put the Unit into service.

Matching connections between boiler and burner are provided to facilitate the ease with which the burner can be mounted on the boiler. Only steam, water, electrical and fuel connections remain to be made and the Unit is ready to operate.



## Delivery from two factories an important advantage

The boiler complete with all controls, piping and accessories is assembled and shipped from the Kewanee Plant . . . the complete burner comes in a separate shipment from the Ray Factory.

Because of its size and weight and incident difficulty of handling, the boiler should be on the building site before the

walls are up. Its construction is such that exposure to weather causes no damage. The mechanism of the burner and its controls being more delicate, it should not arrive until the building is enclosed.

When the Kewanee-Ray Unit is selected, both shipments can be timed to arrive on the job site when required.

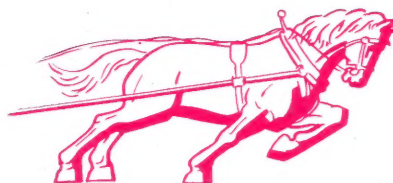
OF COMBINED ENGINEERING EXPERIENCE





## 8.2 SQUARE FEET OF HEATING SURFACE

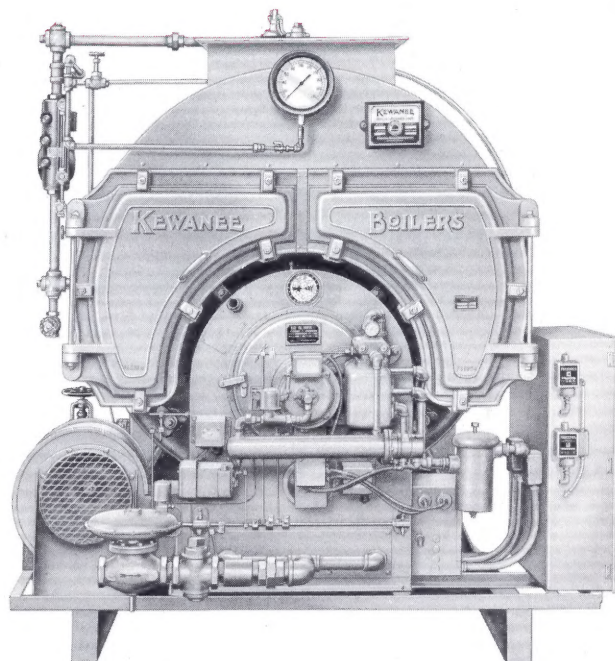
per boiler horsepower



The oil or gas burner generates the heat. The boiler's job is to use that heat by transferring it to the water in the boiler to generate steam. Obviously . . . if the heating surfaces of the boiler are not of sufficient area to absorb all the usable heat . . . much of it will be wasted up the stack.

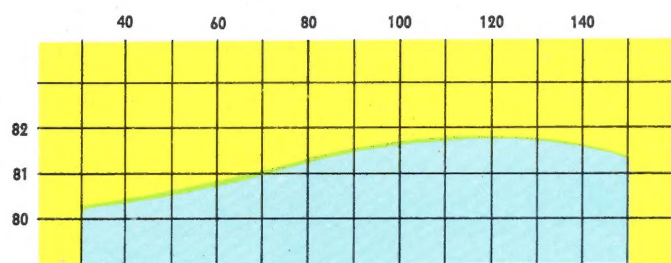
Generously proportioned heating surfaces have long been a distinguishing feature of all Kewanee Boilers. And in the Scotch type . . . used in the Kewanee-Ray Unit . . . 8.2 square feet of heating surface are provided for each horsepower of the unit's nominal rating.

Not only does this extra heating surface insure efficient transfer of the heat during normal operations, but it also provides sufficient surface to permit the boiler absorbing heat, even when fired, to produce 50% more than its nominal rated capacity.

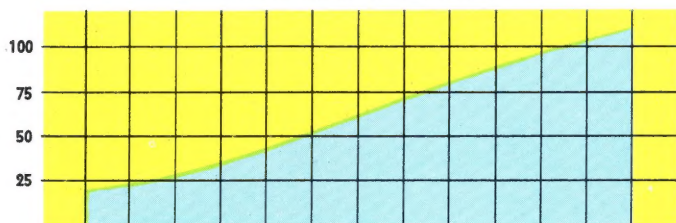


# 80%

## CERTIFIED EFFICIENCY



PERCENT THERMAL EFFICIENCY



EXIT GAS TEMP. ABOVE STEAM TEMP. DEG. F.

Many tests prove the over-all efficiency of the Kewanee-Ray Unit . . . and an *efficiency of 80% is certified*. Actually, under normal "on the job" conditions, much higher efficiencies have been attained and maintained through a very wide firing range.

The charts at the left tell the story . . . showing an over-all efficiency of some 81½% at 100% of rating and over 81% even when the unit is being operated at 150% of rating. The comparatively low temperatures of stack gases prove that an unusually large proportion of the heat is picked up by the water in the boiler and usefully employed in generating steam.

# OUTSTANDING FEATURES OF THE RAY BURNER



## GENERAL DESCRIPTION

The Ray Forced Draft Burner, with multi-stage air control, is designed as a burner unit for the Kewanee Scotch type boilers.

This burner consists of a Ray direct or belt drive horizontal rotary oil burner with a dual pump and reservoir (of any desired specification) mounted directly on the front plate of a windbox and a specially designed low pressure, integrated gas burner. Standard equipment includes all piping on the burner unit; electronic safeguard system; air safety switch; multi-stage air register ring; completely wired control panel; forced draft fan; and a windbox with integral refractory lining sized to project into the boiler furnace tube opening.

A forced draft fan delivers air at constant pressure to the windbox which in conjunction with the air register ring provides a constant velocity type air stream to the combustion zone with high turbulence and a high turn-down ratio.

A totally enclosed control panel contains all the necessary switches, motor starters, relays and electronic control unit providing easy accessibility in one compact unit.

## AIR REGISTER RING ASSEMBLY

The design and position of the "Air Register Ring" with its constant velocity characteristics imparts a high degree of turbulence to the secondary air stream with a consequent rapid rate of combustion and a high turn-down ratio. Evidence of top efficiency is provided by the high percentage of CO<sub>2</sub> attainable. Air pressure in the windbox remains substantially constant throughout the operating range of the "Air Register Ring."

## HEAVY OIL OPERATION

The Ray Forced Draft Burner is designed for fully automatic operation with any grade of oil. For heavy oil operation using #6 and some #5 oils, a unit combination heater, pump and circulating oil system is supplied with thermostatic controls interlocked through the burner controls in the control panel.

## SIMPLICITY OF CONSTRUCTION

The entire air control assembly may be readily removed exposing the gas manifold ring and providing a manhole opening of standard diameter for access to the combustion chamber . . . as well as permitting easy inspection and adjustment of the air control unit. The totally enclosed control panel fits snugly alongside the boiler . . . taking a minimum of space.

## OTHER ASSEMBLIES

The foregoing description applies particularly to the combination burner with full automatic oil burning unit and gas burner. The forced draft air control unit may also be assembled in the following combinations: (1) Integrated low pressure gas burner. (2) Rotary type, motor driven, oil burner for any grade of oil and for manual, semi-automatic and fully automatic operation. (3) Combination of gas unit with any of the oil burners listed.







# RAY GAS AND OIL FIRING ... with complete air

## COMBINATION GAS AND OIL BURNER

The Ray combination Gas and Oil Burner consists of the Ray Forced Draft Horizontal Rotary Oil Burner and the Ray Forced Draft, integrated Gas Burner engineered in a single unit...

### Change Fuels at the Flick of a Switch

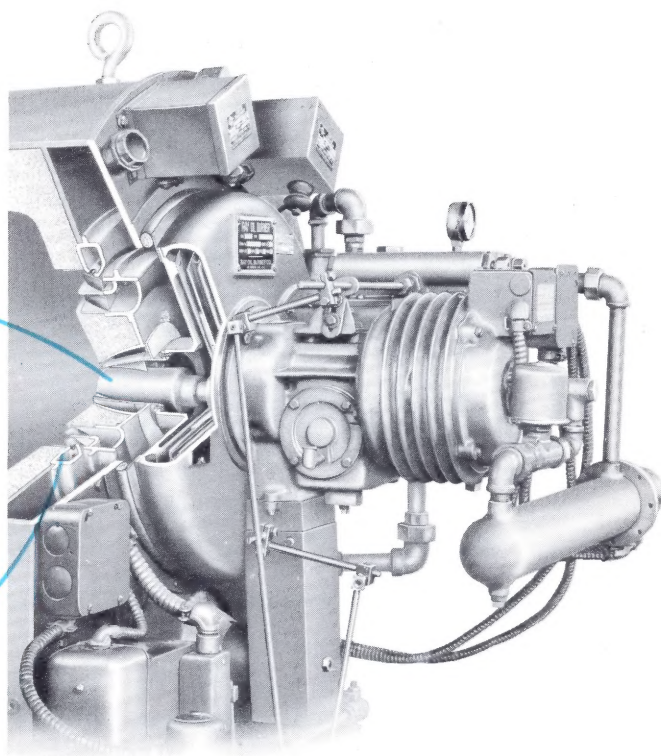
The change in operation from one fuel to another is accomplished by a flick of a switch. No mechanical operation is necessary. The gas burner stays in position on oil firing and the oil burner stays in position on gas firing.

## HORIZONTAL ROTARY OIL BURNER

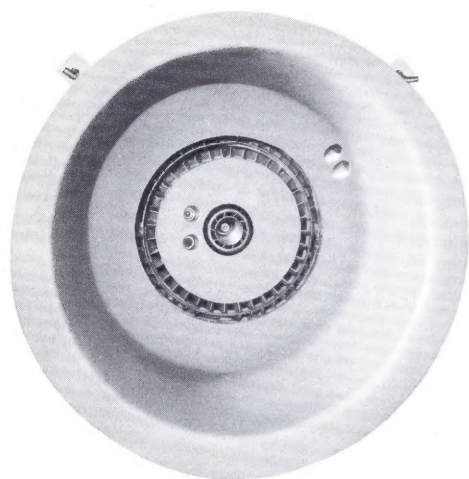
The Ray Rotary Oil Burner, FD-AR, is designed especially for forced draft application. It uses a completely new and different principle of air control and introduction. This *new* method of air control coupled with the Ray Viscosity Valve and the dual pump and reservoir system... which scientifically controls the volume of oil to the burner, regardless of temperature... makes the Ray Forced Draft Burner the leader in its field for fully *automatic... heavy oil operation* at top efficiency ratings.

## INTEGRATED GAS BURNER

The specially designed low pressure gas manifold ring encircles the air stream providing maximum aspiration and mixing effect of the gas and air. The gas ring forms the throat of the forced draft air entrance and the gas is introduced through multiple drilled orifices around the throat. The secondary, high velocity, air stream passing over the orifices creates a suction which assists entry of the gas into the air stream ahead of the combustion zone. Thus the gas is not only pre-mixed, but high or low pressure gas supply may be utilized at top firing ratings and operation of the oil burner motor is not required. Equal gas distribution is assured by two gas inlets, one on either side of the manifold ring.



and fuel control



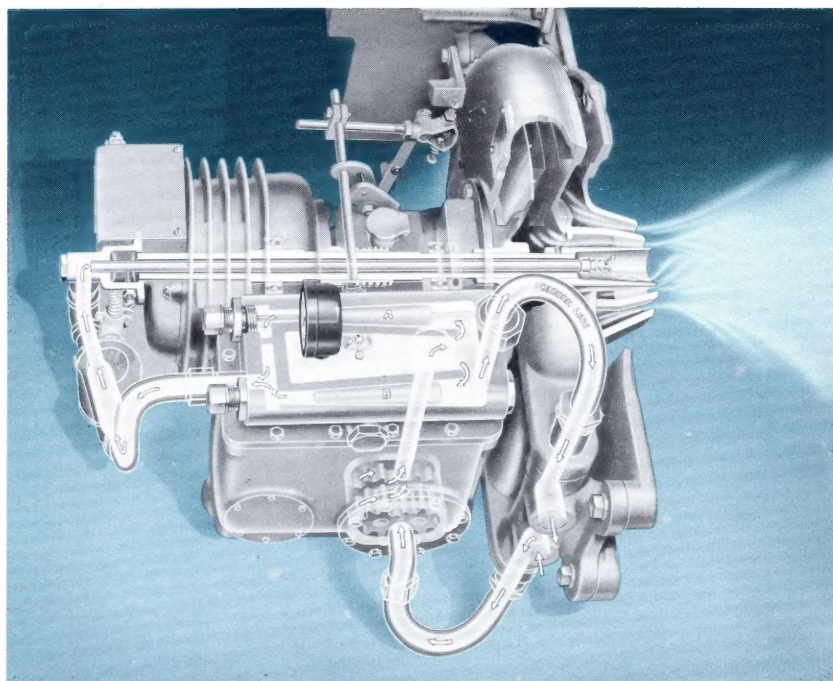
#### MULTI-STAGE AIR CONTROL

The furnace side of the FD-ARC burner shows the multi-stage secondary air control vanes which impart a high degree of turbulence to the secondary air stream with a consequent rapid rate of combustion. Gas is introduced from the outer circle of vanes where it is pre-mixed with the air. The oil atomizing cup and the angular vane nozzle, which controls the primary air for oil burning, are down in the center of the air register assembly.

#### Operation:

The Forced Draft Fan delivers the air to the windbox at substantially constant pressure. Secondary air is then metered by the Ray patented "Air Register Ring." Primary air, also furnished by the Forced Draft Fan, is monitored through the oil burner fan and angular vane nozzle . . . thus the pressure generated by the Forced Draft Fan is added to that of the fan on the burner for increased nozzle velocity and better oil atomization.

Efficient ratio of air to fuel is constantly maintained at all firing rates by the Ray Automatic Control System. This control system is operated by a fully modulating motor, positioning the interconnected Ray Oil Viscosity Valve, gas butterfly valve, primary atomizing air valve and secondary air register ring, regulating the fuel and air as the load demands.



#### VISCOSITY VALVE AND DUAL PUMP & RESERVOIR SYSTEM

The Ray VISCOSITY VALVE is a patented, exclusive feature of all Ray fully automatic heavy oil burners. It supplies the burner with a scientifically controlled volume of oil which is unaffected by changes in temperature or viscosity of the oil and maintains a controlled firing rate which varies only to meet changing load requirements.

The greatest advantage of the Ray VISCOSITY VALVE over similar devices for controlling the oil flow is that it accomplishes so much without any moving parts . . . it does not adapt itself to changes in viscosity; it makes the oil adapt its rate of flow to the needs of the burner. In the valve itself, there are no moving parts, no mechanisms to wear out.

An integral part of the Ray VISCOSITY VALVE system is the Ray Dual Pump and Reservoir. The dual, gear type pumps are submerged in a reservoir of oil with the primary pump drawing oil from the storage tank to the reservoir and the secondary pump delivering a constant volume of oil to the VISCOSITY VALVE. By allowing air to separate from the oil and be exhausted back through the return line, the reservoir eliminates the danger of flame instability and failure resulting from leaky suction lines or oil vapor formation.





**STEAM SPACE**  
Amplly proportioned to assure large reserve of dry steam.

**SHELL**  
Shaped from heavy flange steel in both high and low pressure units. Heads and furnace of firebox quality in high pressure units. All welds in accordance with A.S.M.E. Code. 125 and 150 psi units stress relieved.

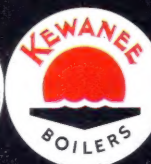
**STURDY HINGED FLUE DOORS**  
Held firmly in place with quick opening U-bolts and gasketed for permanent gas tight fit. Provides easy access to tubes for cleaning and inspection.

Improved method of diagonal bracing now extends through boiler shell. Eliminates hidden weld and assures positive dependability.

**DISENGAGING AREA**  
Unbroken to check turbulence.

# THE KEWANEE-RAY BOILER-BURNER UNIT

125-150 swp



**WINDBOX**  
Distributes air to the secondary air control system and acts as the structural backbone of the burner unit upon which all the elements are mounted.

**CONTROL PANEL**  
All controls for combustion are in the totally enclosed panel and include all necessary switches; motor starters; relays and the electronic control unit.

**RAY DIRECT DRIVE**  
The Ray principle of Direct Drive with the air-cooled and totally enclosed motor mounted as an integral part of the burner on the main shaft.

**RAY HORIZONTAL ROTARY ATOMIZATION**  
The Ray atomizing cup and angular vane nozzle are so constructed that the oil and primary air are discharged in opposite directions of rotation providing intimate mixing of air and fuel under absolute control at the nozzle tip.

**AUTOMATIC GAS CONTROL VALVE**

**SECONDARY AIR CONTROL ASSEMBLY**  
Ray "patented air register ring" maintains constant air velocity at all firing rates.

**INTEGRATED GAS BURNER**  
The gas ring forms the throat of the forced draft air entrance with the gas being introduced through multiple drilled orifices around the throat.

**FORCED DRAFT FAN**

**SPINNER BLADES**  
Located in all tubes swirl the hot gases against tube surfaces providing longer gas travel and assure maximum heat transfer.

**CORRUGATED FURNACE**  
Provides extra strength and added heating surface next to the fire. Low pressure units provided with plain furnace tube.

**FIRE TUBES**  
Three inch diameter heavy gauge steel, expanded into holes with ends firmly rolled and beaded.

**STURDY STEEL SKIDS**  
Simplifies handling and installation problems and provides platform on which burner is mounted. Requires no special base construction.

**REAR COMBUSTION CHAMBER**  
Heavily lined with refractory shipped in place. Completes combustion and preserves heat, thereby increasing efficiency.

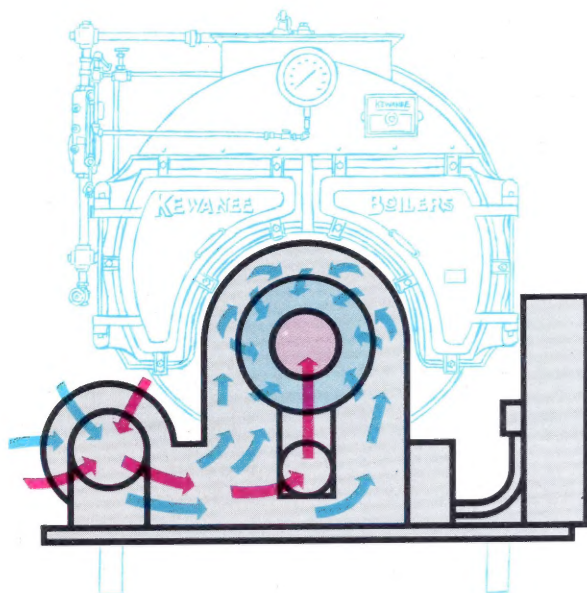
Units for high pressure steam incorporate dry back design, split rear cover plate with access opening to combustion chamber in lower half and opening to fusible plug in top half. All low pressure units designed with water back top.

Furnace on low pressure boilers is now attached to flanged openings in tube sheet to provide for greater flexibility.





## CONSTANT VELOCITY CONTROL OF THE AIR



Provides smooth, easy starts with high turn-down ratio and high CO<sub>2</sub> content; eliminates the use of high stacks . . . with proven HIGH EFFICIENCY RATINGS!

With the Kewanee-Ray Forced Draft Boiler-Burner Unit you will no longer have to depend upon high stacks and favorable barometric conditions for high efficiency at all firing rates. The forced draft fan delivers the air to the windbox under constant pressure at all ratings.

The Forced Draft Fan in coordination with the "Air Register Ring" provides for air admission, with a high degree of turbulence, at the point of combustion only and eliminates the necessity of any other draft control conventionally used.

## Complete Control System, pre-wired in enclosed panel

Electronic Combustion Control System positively prevents operation under unsafe conditions and causes immediate shut-down in the event of flame failure. This system also monitors the complete firing cycle from pre-ignition purge through post-fire purge and checks the pilot and establishment of the main flame.

Terminal Strip . . . completely wired at the factory to controls and burner components.

Transformer for modutrol motor power supply.

High Limit Control on the end of the control panel starts and stops the burner unit according to the demand for pressure or temperature.

Gas-Oil Selector Switch for change-over from one fuel to another. No mechanical operation is necessary.

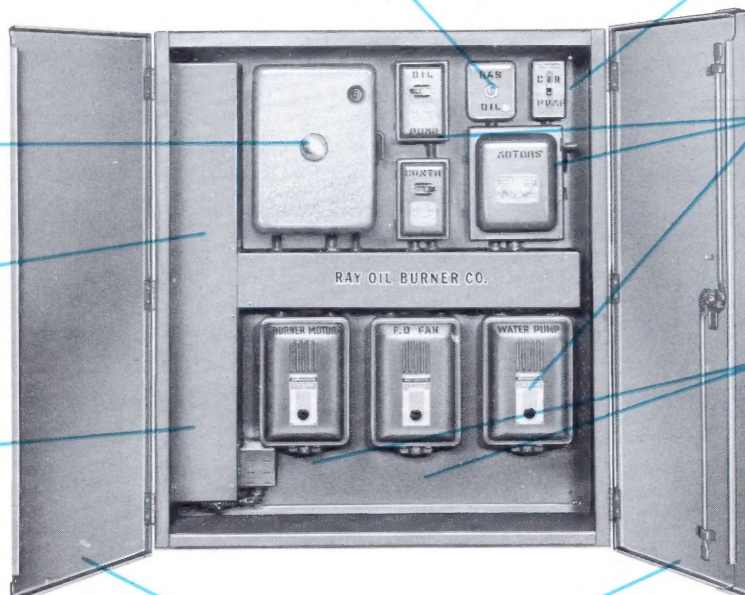
Circuit Breaker for the oil circulating pump.

Magnetic Starters with no-voltage and overload protection, stop and start the burner motor and forced draft fan motor in response to control demands. Optional equipment for boiler feed unit.

Three Disconnect Switches for the control circuit, the oil circulating pump and the burner and forced draft fan motors.

Panel Doors protect controls and wiring from damage, dirt and water.

Modulating Control, mounted on end of panel, controls the operation of modutrol motor mounted on burner, for complete regulation of air and fuel supply.







More Engineering . . . More Material . . . More Experience

Make **KEWANEE** Boilers different!

Ask any user, engineer, architect or heating or power contractor . . . they will tell you that in their field Kewanee Boilers lead, as they have for nearly a century. That reputation has been earned by the true quality which is built into every Kewanee product.

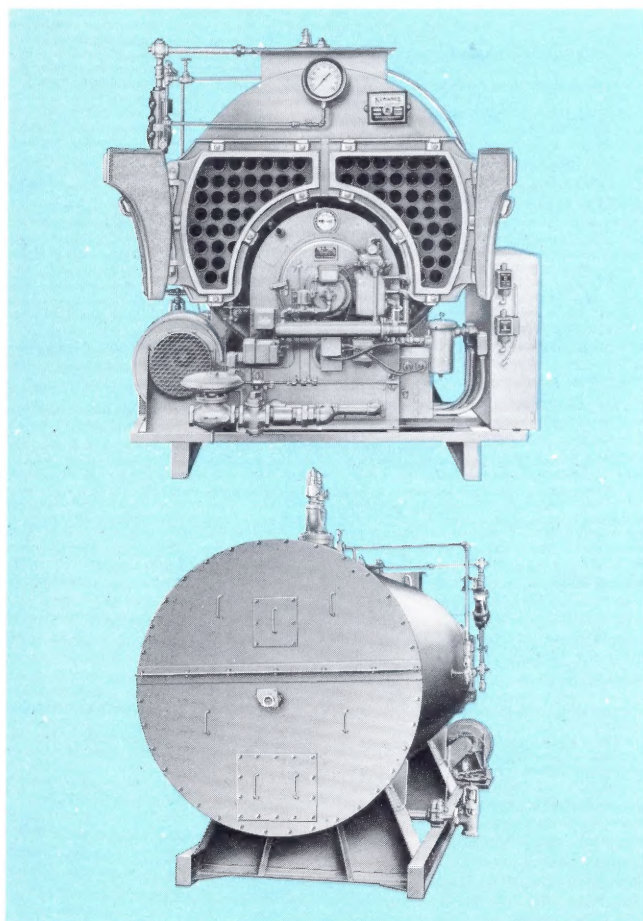
Kewanee *puts more* into its boiler so the owner *gets more* from them.

From drafting board to finished product . . . the experience and skill of Kewanee engineers has been continuously applied. First in the design and proportioning of all parts to be certain that each will work properly with all the others. Then by closely watching the boilers in process of construction and fabrication. And finally in tests that insure boiler performance as planned. Yes . . . there is MORE ENGINEERING in each Kewanee.

MORE MATERIAL . . . the generous proportioning of all parts and the use of heavier steel plate not only insures more reliable ruggedness but equips each Kewanee to handle large overloads easily and efficiently.

MORE LABOR . . . examine any part of any Kewanee. Notice the faultless seams and welds, the smooth finish of castings, and the care with which each part is firmly fixed in its place. This extra care requires more labor, but it puts something extra in the boiler.

And back of all these is MORE ENGINEERING . . . a knowledge and "know how" which can only be obtained by many years of experience. These are the things which have built an enviable reputation for Kewanee . . . they are the "extras" you buy with every Kewanee Boiler that can't be converted into terms of dollars and cents.



Easy to clean . . .  
easy to inspect

There are two sides to every boiler and every part of the Kewanee is easy to get at!

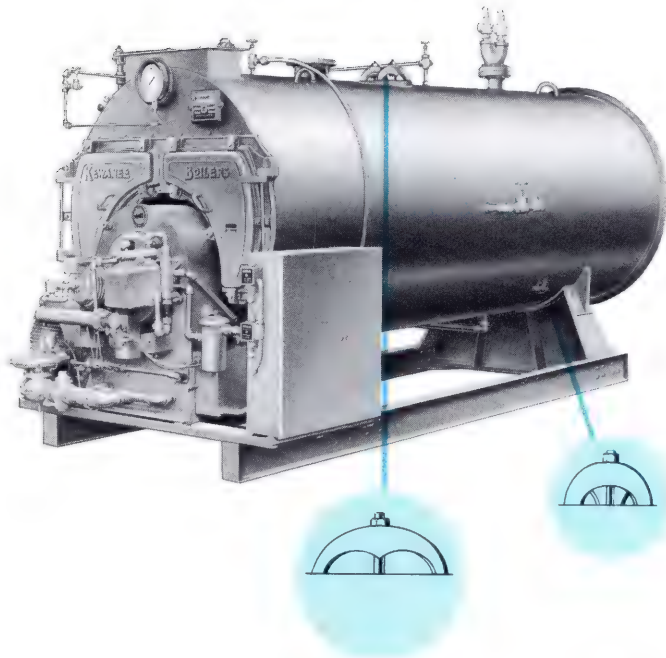
The large hinged doors at the front swing open, clear of the burner, providing easy access to the fire tubes from the front for ease of cleaning and inspection.

The entire back cover plate, constructed in two parts, can be completely removed for access to the rear combustion chamber and the rear end of fire tubes. Or the rear combustion chamber can be cleaned through the clean-out door at the bottom, without removing the cover plate.





## COMPARE THESE QUALITY FEATURES



### ACCESSIBLE WATER SURFACES

The water surfaces are just as easy to inspect and clean as the fire tubes.

A large manhole through the top of the boiler and adequate washout openings, properly placed, give ready access to the waterways. Fire tubes are widely spaced to make the outside of the tubes easily accessible. This spacing further frees and speeds-up the circulation of the water.

Carbon deposits inside the fire tubes . . . or scale lining the waterways . . . provides an insulation that makes it difficult for the heat to get through. So an unkept boiler . . . a dirty boiler . . . can't produce steam with full efficiency.

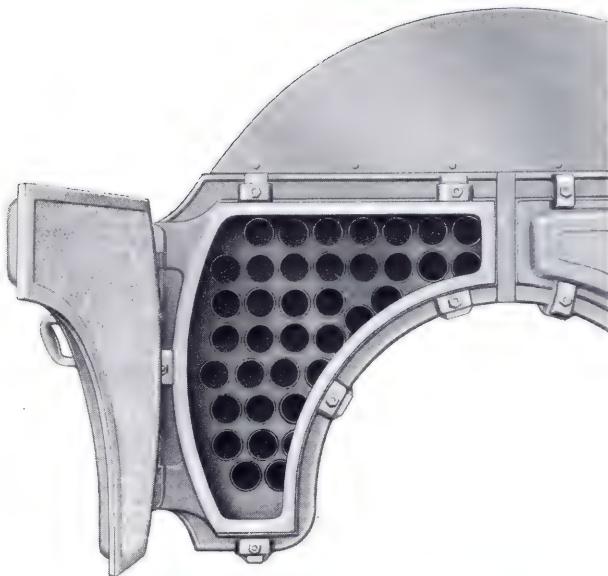
But with a Kewanee both fire tubes and waterways are easy to get at . . . an important feature that helps keep the boiler operating as it was built to perform.

### GAS TIGHT FLUE DOORS WITH QUICK OPENING U-BOLTS

Leakage of heat through flue doors, or other openings, causes efficiency losses of considerable importance in many boilers.

Kewanees are made with permanent gas-tight doors . . . ground to a precision fit and sealed by a riveted woven asbestos tape gasket. Place a thin piece of tissue paper in the opening; shut the door, tighten the U-bolts, and it's impossible to pull the paper out without tearing it. Try it sometime yourself . . . you'll find the doors on Kewanee Boilers fit that closely.

Note, too, the thick insulating lining on the inside of the door that prevents warpage and provides a positive gas-tight fit throughout the life of the boiler.



### A. S. M. E. CODE CONSTRUCTION . . . S. B. I. RATED

In construction Kewanee Boilers meet or exceed all the rigid code requirements of the American Society of Mechanical Engineers; as well as those of a well-known independent boiler inspection and insurance company.

The Kewanee-Ray Units are rated in accordance with the provisions of the Steel Boiler Institute Code . . . yet are certified to produce at least 50% more than this nominal capacity.

In addition, Ray Burners are built to rigorous standards to comply with all requirements of the Underwriters' Laboratories, Inc., and bear its seal of approval where required.





# FOR YOURSELF

## NO. 1 WELD, X-RAYED AND STRESS RELIEVED

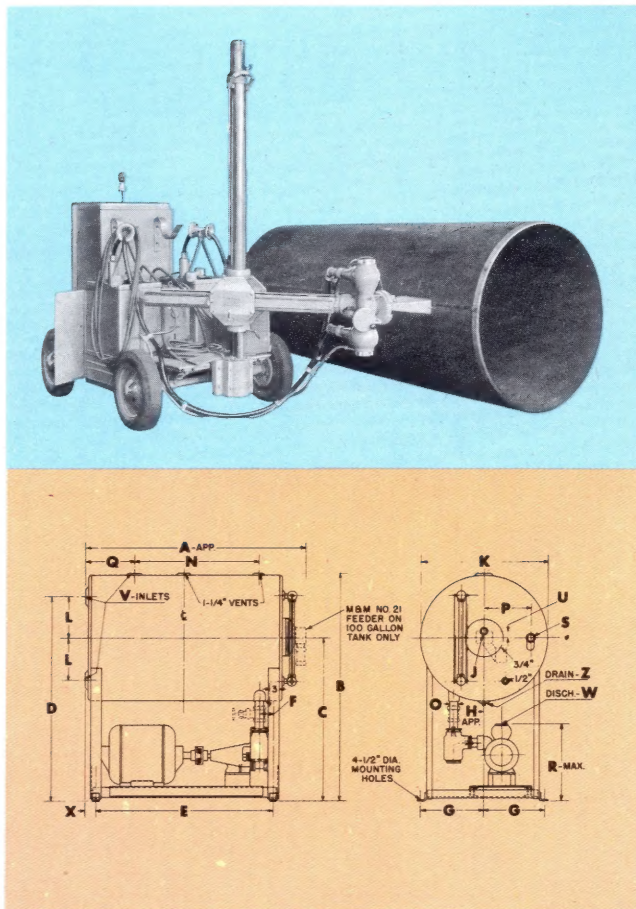
The dependability of welded joints, for both high and low pressure boilers has reached new heights. But to be even surer and safer, every welded seam that carries the full operating load in high pressure Kewanees is radiographed with a high voltage X-ray machine to detect possible blow holes due to gas pockets, faulty fusion or any other defects. Test specimens are then stressed to destruction to be certain that the strength and ductility of all joints meet specifications.

And in a modern *Stress Relieving Furnace*, Kewanee Boilers for high operating pressures are heated to a temperature of 1200° F. then allowed to cool gradually. All fusion welded joints are thus completely annealed and any locked up stresses relieved.

## PUMP AND RECEIVER

If specified, a Boiler Feed Unit is included with the boiler shipment. This equipment is not attached to the boiler skids, allowing installation at the most convenient place. There are 13 sizes for units of 39 to 304 hp . . . 125 and 150 lbs. wp.

The single pump unit is shown. Duplex Units, consisting of 2 pumps and 2 motors mounted on a single chassis with the tank, are also available. These Duplex Units are often advisable for stand-by purposes or with a battery of 2 boilers . . . each boiler supplied by a separate pump.



## BOILER FEED UNITS Dimensions — Inches

UNIT	A	B	C	D	E	F	G	H	J	K	L	N	O	P	Q	R	S	U	V	X	Z	PUMP SIZE	W
KXE 42	60	47¾	55½	33	3⅝	11¼	3½	¾	22½	7¾	23	1½	..	9½	14¾	..	1½	2½	2½	1	1130 – 1133	1	
KXF 46	78	63½	73¾	36	4½	14	5	..	27	10¼	28	1½	..	9	18¼	..	..	3	3	1¼	1143 – 1148	1¼	
KXG 66½	78	62	73	56	4½	14⅜	5½	..	30	11	48	2	12	9	19¼	¾	..	4	3¼	1½	1251 – 1253	1¼	
KXH 66½	78	60	74½	56	4½	17½	7¼	..	36	14½	48	2	15	9	20⅝	¾	..	4	3¼	1½	1255 – 1259	2	
KXJ 66½	78	56	73	56	6	20¼	8	..	42	17	48	2½	15	9	21⅝	¾	..	4	3¼	1½	2255 – 2257	2	
KXK 90½	78	56	73	78	6	20¼	8	..	42	17	72	2½	15	9	18¾	1	..	4	4	1½	2279 – 2283	2	

## SPECIFICATIONS AND CATALOG NUMBERS

UNIT NUMBER	KR78-3-5	KR79-3-5	KR80-5	KR81-5	KR82-5	KR83-6	KR84-6	KR85-7	KR86-7	KR87-8	KR88-8	KR89-9	KR90-9
Boiler Feed Unit Number....125 swp	KXE-10	KXE-12	KXF-11	KXF-11	KXF-12	KXF-12	KXG-20	KXG-8	KXH-20	KXH-22	KXJ-20	KXJ-20	KXK-20
GPM—Maximum 195° F.....	7.9	8.9	10.5	12.6	15.4	18.2	22.4	27.3	32.2	36.4	45.5	54.6	63.0
Pump Number .....	1130	1131	1133	1133	1141	1141	1252	1255	1255	1255	2257	2257	2283
Motor Size .....hp—RPM	2-3450	3-3450	3-3450	3-3500	3-3500	3-3500	5-3500	7 1/2-3500	7 1/2-3500	10-3500	10-3500	10-3500	15-3500
Tank Capacity .....gal	60	60	100	100	100	100	200	200	250	250	350	350	500
Shipping Weight .....lb	550	600	650	650	650	650	850	900	1050	1150	1400	1400	1650
Boiler Feed Unit Number....150 swp	KXE-12	KXE-12	KXF-11	KXF-21	KXF-22	KXF-22	KXG-20	KXG-21	KXH-21	KXH-21	KXJ-20	KXJ-21	KXK-21
GPM—Maximum 195° F.....	7.9	8.9	10.5	12.6	15.4	18.2	22.4	27.3	32.2	36.4	45.5	54.6	63.0
Pump Number .....	1131	1131	1133	1251	1252	1252	1252	2255	2255	2255	2257	2279	2282
Motor Size .....hp—RPM	3-3450	3-3450	3-3450	5-3500	5-3500	5-3500	5-3500	10-3500	10-3500	10-3500	10-3500	15-3500	20-3500
Tank Capacity .....gal	60	60	100	100	100	100	200	200	250	250	350	350	500
Shipping Weight .....lb	600	600	650	750	650	650	850	1050	1200	1200	1400	1550	1700





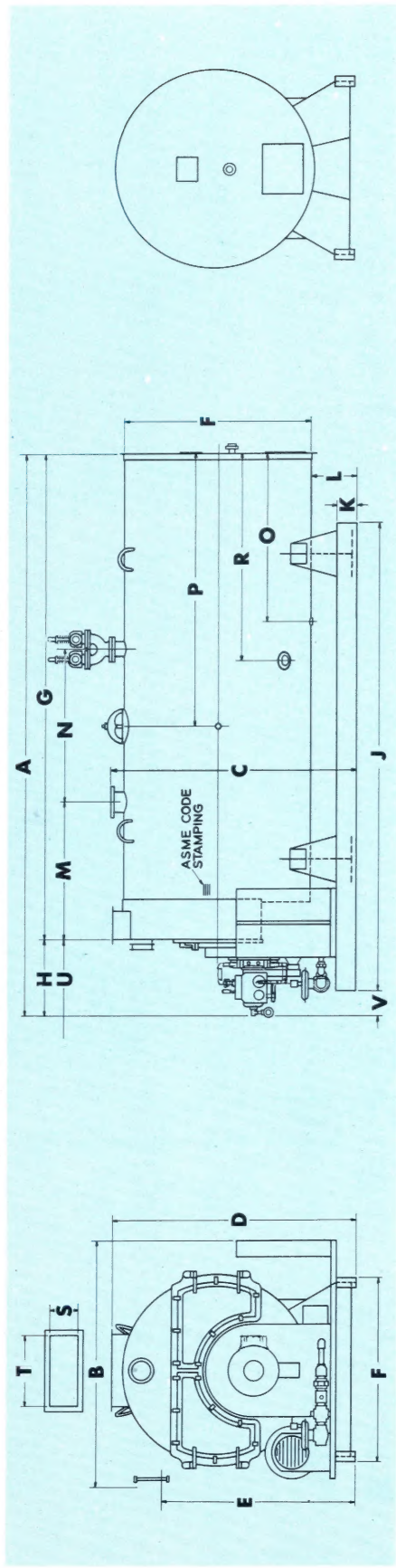
RATINGS, DATA AND DIMENSIONS

NOTE: When selecting Boiler-Burner Unit sizes, specify (a) Unit Number (last numeral in unit number indicates burner size), (b) Burner specifications (as enumerated below), (c) Operating Pressure, (d) Type (steam or hot water), (e) Gas Type and Pressure, (f) Boiler Feed Unit No. for high pressure units (optional).

UNIT NUMBER		KR78-3-5	KR79-3-5	KR80-5	KR81-5	KR82-5	KR83-6	KR84-6	KR85-7	KR86-7	KR87-8	KR88-8	KR89-9	KR90-9
SBI Rating — Horsepower	39	44	52	61	74	87	109	130	152	174	217	261	304	
Steam per Hour — 212° F.	1350	1500	1800	2100	2560	3010	3750	4510	5260	6010	7510	9010	10510	
Btu per Hour	1313	1459	1750	2040	2479	2916	3643	4373	5100	5830	7286	8743	10200	
EDR Steam	5470	6080	7290	8500	10330	12150	15180	18220	21250	24290	30360	36430	42500	
EDR Water	8750	9720	11660	13600	16520	19440	24280	29150	34000	38860	48570	58280	68000	
Certified Output Rating**	59	66	78	92	111	131	164	195	228	261	326	392	456	
Firing Rate — Oil gph*	16	18	22	26	31	37	46	54	64	73	91	110	127	
Gas Btu/hr	2460	2740	3280	3830	4650	5460	6840	8200	9560	10920	13670	16400	19120	
Heating Surface	322	358	429	500	608	715	893	1072	1250	1429	1786	2143	2500	
Furnace Volume	45.8	48.4	57.9	62.4	79.8	87.5	110.2	141.1	153.7	174.0	217.0	262.9	308.8	

\*Fuel burning rates based on 150,000 Btu oil.

\*\*Output ratings based on 80% overall efficiency and 60 cycle operation at sea level.



DIMENSIONS (feet-inches)

UNIT NUMBER	KR78-3-5	KR79-3-5	KR80-5	KR81-5	KR82-5	KR83-6	KR84-6	KR85-7	KR86-7	KR87-8	KR88-8	KR89-9	KR90-9
A — Length Overall .....	14-2	15-1	14-1	15-3/2	15-8	17-4	18-6	19-6	21-5	20-7	21-8	23-7	23-6
B — Width Overall .....	6-11	6-11	7-4	7-4	7-7	7-7	7-10	8-6	8-6	9-2	9-2	10-2	10-2
C — Steam Supply Height .....	6-8	6-8	7-2	7-2	7-8/2	7-8/2	8-0	8-8/2	8-8/2	9-9/2	9-9/2	10-3/2	11-0/2
D — Smoke Outlet Height .....	6-6	6-6	7-0	7-0	7-6	7-6	8-0	8-6	8-6	9-0	9-6	10-0	10-9
E — Water Line Height .....	5-5	5-5	5-10	5-10	6-1/2	6-1/2	6-5/2	6-9/2	6-9/2	7-1/2	7-7	7-11/2	8-8
F — Boiler Diameter — Base Width .....	4-6	4-6	5-0	5-0	5-6	5-6	6-0	6-6	6-6	7-0	7-6	8-0	8-6
G — Boiler Length .....	11-8	12-7	11-7	12-9/2	14-10	14-10	16-1	16-7	18-1	17-9	18-11	20-0	20-1
H — Front of Unit to Boiler .....	2-6	2-6	2-6	2-6	2-6	2-6	2-5	2-11	2-10	2-10	2-9	3-7	3-5
J — Base — Length .....	11-3	12-2	11-2	12-4	12-7	14-3	15-4	15-6	17-6	16-7	17-7	18-9	18-10
K — Height .....	0-6	0-6	0-6	0-6	0-8	0-8	0-8	0-10	0-10	1-0	1-0	1-0	1-3
L — Floor to Boiler .....	1-8	1-8	1-8	1-8	1-8	1-8	1-8	1-8	1-8	1-8	1-8	1-8	1-11
M — Steam Supply .....	3-0	3-6	3-1	3-7	3-8	4-2	4-9	4-10	5-4	5-5	5-5	5-6	5-7
N — Safety Valve .....	3-6	4-3	4-3	4-4	4-5	5-0	5-0	5-0	6-6	5-6	6-6	7-0	7-0
O — Blow-off .....	4-0	4-0	4-0	4-0	4-3	4-3	4-5	5-4	5-6	5-6	5-6	5-6	5-6
P — Feed Water, each side .....	6-7	7-1	6-6	7-1	7-4	8-2	8-10	9-3	10-3	9-10	10-6	11-0	11-0
R — Return 15 lb swp, each side .....	4-4	4-4	4-4	4-4	4-9	4-9	5-3	5-8	6-2	6-3	6-5	6-7	6-7
S — Smoke Outlet — Width .....	0-10	0-10	0-10	0-10	0-10	0-10	0-11	1-1	1-1	1-2	1-2	1-4	1-6
T — Length .....	1-4	1-4	1-8	1-8	2-4	2-4	2-4	2-8	2-8	2-8	3-2	3-4	3-4
U — Tube Replacement Space .....	7-2	8-1	6-11	8-1/2	8-2	9-10	10-9	10-8	12-8	11-7	12-7	13-6	13-5
V — Front of Unit to Base .....	1-5	1-5	1-5	1-5	1-5	1-5	1-4	1-9	1-8	1-8	1-7	2-4	2-2



Vent Size	1-2	1-3	1-4	1-5	1-7	1-8	1-10	1-11	2-0	2-2	2-4	2-6
Safety Valve Capacity — over 15 lb swp —	2576	3432	4000	4864	5720	7144	8576	10000	11432	14288	17144	20000
— 15 lb swp —	1610	2145	2500	3040	3575	4465	5360	6250	7145	8930	10715	12500
Steam Supply Size — 15 lb swp** over 15 lb swp***	0-6	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-10	0-10	0-10
Blow-off Size	0-4	0-4	0-4	0-6	0-6	0-6	0-6	0-6	0-6	0-8	0-8	0-8
Return Size	0-1/2	0-2	0-2	0-2	0-2	0-2	0-2	0-2 1/2	0-2 1/2	0-2 1/2	0-2 1/2	0-2 1/2
Outside Surface to Cover — sq ft	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	**0-6	**0-6	**0-6
Approx. Weight— 15 lb swp**** 125 lb swp***** 150 lb swp*****	9900 10500 11100	10400 11000 11700	11200 13100 13400	14300 16200 16900	15600 17900 18300	18200 20900 22100	21900 25400 27900	24000 26700 29700	27500 32100 33800	32200 37500 40000	39300 45200 48100	43300 50200 53400

\*\*150 lb American Standard Flange.  
\*\*\*300 lb American Standard Flange.  
\*\*\*\*Add 300 lb for unit pump and heater.  
\*\*\*\*\*Add 300 lb for unit pump and heater.

STANDARD EQUIPMENT (15 lb STEAM) — Pressure controls, safety valve, pump control and low water cut-off, blow-off valve and piping, water column with water-gage glass and three gage cocks, steam gage and cock, injector, piping and fittings for attaching trimmings to the boiler.

STANDARD EQUIPMENT (30 lb WATER) — pressure gage, thermometer, water temperature control, water relief valve, low water cut-off, piping and fittings for attaching trimmings to boiler.

SAFETY VALVES — Boilers over 15 lb swp — Number and size varies with valve setting. All boilers having 500 sq ft or less of heating surface furnished with one valve. Boilers having more than 500 sq ft of heating surface furnished with two or more valves. Manufacturer reserves the right to use separate outlets or yokes as conditions require.

Boilers 15 lb swp — One or more valves furnished depending on required capacity.

## BURNER SPECIFICATIONS (All Modulating, Fully Automatic)

SIZE	CAPACITIES	STEAM LBS/HR	BURNER MOT. HP	FD FAN MOT. HP	GAS PRESS. "W.C."	PIPE SIZE CONN.	FUEL	BURNER
3-5	OIL GHP 23 GAS CFH 3450	83	1	3/4	4	3"	Combination #6 oil and gas	FD-ARC-144
5	33 4950	119	1	1	5	3"	Combination #5 & #4 oil and gas	FD-ARC-134
6	50 7500	180	1 1/2	1 1/2	7	3"	Combination #2 oil and gas	FD-ARC-104
7	67 10000	240	2	1 1/2	7	4"	#6 oil	FD-AR-144
8	100 15000	340	3	2	8	4"	#5 & #4 oil	FD-AR-134
9	150 22500	540	5	3	10	4"	#2 oil	FD-AR-104
							Gas, high or low pressure	FD-G-104

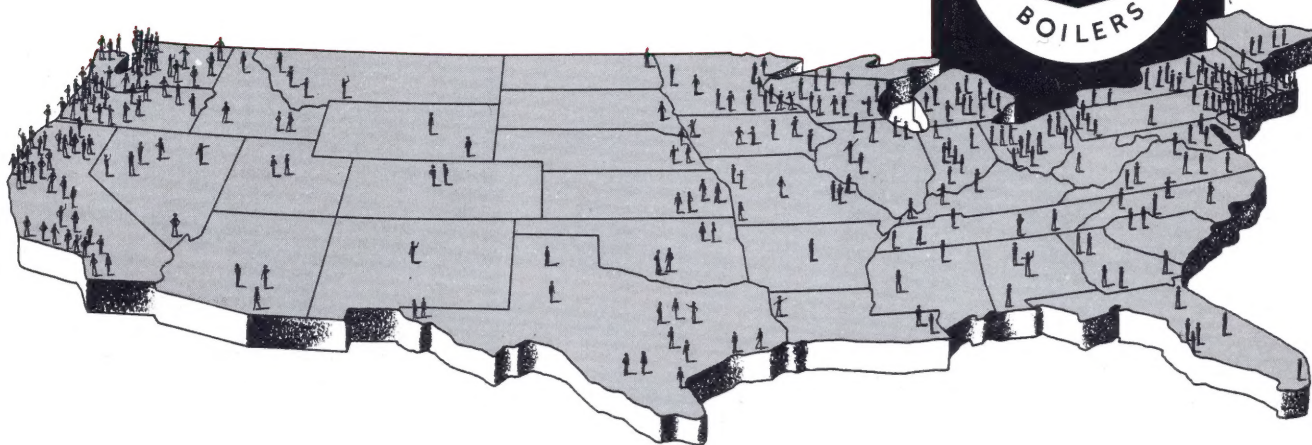
\*Based on 60 cycle operation at sea level.

STANDARD EQUIPMENT	COMBINATION #6 OIL & GAS FD-ARC-144	COMBINATION #5 & #4 OIL & GAS FD-ARC-134	COMBINATION #2 OIL & GAS FD-ARC-104	#6 OIL FD-AR-144	#4 & #5 OIL FD-AR-134	#2 OIL FD-AR-104	GAS L & H PRESSURE FD-G-104
Windbox	x	x	x	x	x	x	x
Integral refractory lining	x	x	x	x	x	x	x
Electronic flame safeguard control	x	x	x	x	x	x	x
Air register ring	x	x	x	x	x	x	x
Air safety switch	x	x	x	x	x	x	x
Forced draft fan	x	x	x	x	x	x	x
Gas-electric ignition	x	x	x	x	x	x	x
Modutrol motor	x	x	x	x	x	x	x
Pressuretrols	x	x	x	x	x	x	x
Control panel	x	x	x	x	x	x	x
Direct Drive, Rotary oil burner (1)	x	x	x	x	x	x	x
Dual pump and reservoir	x	x	x	x	x	x	x
Viscosity valve	x	x	x	x	x	x	x
Oil strainer	x	x	x	x	x	x	x
Check valve	x	x	x	x	x	x	x
Electric oil heater	x	(2)	x	x	(2)	x	x
Pre-heater and pump set	x	(2)	x	x	(2)	x	x
Ring type gas burner	x	x	x	x	x	x	x
B-55 gas valve (3)	x	x	x	x	x	x	x
Butterfly valve (3)	x	x	x	x	x	x	x
Plug type metering valve (3)	x	x	x	x	x	x	x

- (1) Also available with belt drive (BR)
- (2) Some #5 oils may require a pre-heater under certain conditions.
- (3) Piped on burner unit.



## ACROSS THE NATION



**I**t has been oftentimes said that a product is only as good as the name and reputation of its maker. To this we might add still another test of real worth...predicated on the standpoint of service.

Not only is the Kewanee-Ray Boiler-Burner Unit backed by the outstanding reputations of two famous names in the industry, but by an extensive service organization that combines the skills and experience of the field representatives of both companies. This close availability of Kewanee-Ray service is added insurance that your specifications and investment is fully protected.

There is a Kewanee or Ray representative near you. Should you be unable to locate him in the yellow pages of your telephone directory, call or write the Kewanee or Ray factory.

In addition, Ray Oil Burner Company is represented by over 300 dealers located in every major city throughout the world... each equipped to provide competent engineering facilities and complete factory certified service, no matter where you are.

Ray dealers are perfectionists, of long experience, who demand quality and peerless performance far in excess of any commercial standard. That is why, today, "Every Third Rotary Oil Burner in Service is a Ray."